REMARKS

Careful consideration has been given to the Official Action of January 22, 2007 and reconsideration of the application is respectfully requested.

Claims 6 and 24 have been amended to overcome the objections of the Examiner.

Claim rejection under 35 USC §102(e)

Claims 1-3 have been rejected under 35 U.S.C. §102(e) as being anticipated by Driscoll Jr. et al. (US 2004/0008423) and Claims 1-7 and 10-13 have been rejected under 35 U.S.C. §102(b) as being anticipated by Charles (US 6,449,103):

a. In the optical structure described in Driscoll, et al. the light rays that enter the lens are refracted at a first surface and then reflected from two different surfaces before being refracted again on exiting the lens in the direction of the detector.

b. Because of the large number of figures, lack of adequate description for most of the embodiments, and in particular the lack of reference in the description to many of the identification numerals that appear in the figures, it is difficult to ascertain exactly the characteristics of all of the embodiments listed in Charles. Nonetheless, at least for the figures cited by the examiner in the Office Action, the optical paths of the rays inside the lenses described by Charles also all comprise "double reflection" as described above.

c. For all embodiments of the present invention the light is refracted as it enters the lens, is reflected only once, and then exits the lens towards the detector.

d. The fact that the lenses of the present invention involve only a single reflection as opposed to the double reflection of the lenses of the cited prior art provides at least

two practical advantages. Firstly, the design of the dimensions, curvature of the surfaces of the lens of the invention may be simpler. Secondly, although theoretically minimizing the number of reflections should not necessarily reduce the severity of the optical aberrations, in practice the larger the number of surfaces the more aberrations and degradation of the images due to manufacturing errors/tolerances and to scattering that takes place at each surface.

Claim rejections under 35 U.S.C. § 103(a):

a. Claims 1-5, 7, and 10-13 have been rejected over Wallerstein (US 6,885,509) in view of Driscoll Jr. et al. (US 2004/0008423).

In making this rejection Examiner reasons as follows:

"*Wallerstein discloses as is set forth above but does not disclose the main lens "produced from an aspheric optical block". Driscoll teaches that in using a panoramic lens for viewing a 360 degree surrounding panoramic scene (Figures 1C and 1D, paragraph 0043) that it is desirable to have the lens formed from an aspheric optical block for the purpose of providing a higher degree of resolution near the lens horizon (paragraphs 0012, 0042-0043). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the lens of Wallerstein as being formed from an aspherical optical block since Driscoll teaches of the desirability of using an aspherical optical block for the purpose of providing a lens of increased resolution.*"

Applicant disagrees with Examiner's interpretation of Driscoll, particularly with regard to paragraph [0012], which is the most relevant to Examiner's argument. Paragraph

[0012] of Driscoll reads as follows:

"*According to an aspect of the present invention, the panoramic lens is aspherical, and formed such that the panoramic image is anamorphic, with a higher degree of resolution near the lens horizon. This arrangement provides enhanced detail in the region that is typically of most interest (i.e., the face and upper torso of meeting participants sitting around a conference table) to an audience viewing the panoramic image.*"

In Applicant's opinion Driscoll is not necessarily teaching either "*the desirability of using an aspherical optical block for the purpose of providing a lens of increased resolution*" or "*that it is desirable to have the lens formed from an aspheric optical block for the purpose of providing a higher degree of resolution near the lens horizon*". Driscoll set out to provide an optical system which would provide images in a certain setting and chose an aspherical panoramic lens to provide a solution for his specific application. Having made that decision, in order to optimize the results and keeping the particular problem he wishes to solve in mind (see the last sentence in [0012]), he designs the lens such that it provides an anamorphic image having its highest resolution near the lens horizon.

It is not true that an aspheric lens necessarily has to provide an anamorphic image although panoramic optical systems generally provide anamorphic images irrespective of their design. However, many types of panoramic lens systems other than ones constructed from aspherical optical blocks are known in the art.

It is also not necessarily true that the resolution of either an aspheric or an anamorphic

lens is necessarily the highest at the lens horizon. These properties are the result of the shape of the surfaces of the lens and of the location of the reflective and refractive areas on those surfaces and optical designers are able to design panoramic imaging systems with their greatest resolution at any specified angle relative to the horizon of the optical system.

For an application other than that of Driscoll, for example the application of Wallerstein, it might be desirable that the maximum resolution not be at the lens horizon. For example if Wallerstein's panoramic imaging arrangement were placed on top of a pole on an island in the center of a highway to observe the flow of traffic, then it would be desirable that the lens be designed such that the maximum resolution would be at angle pointing downward towards the center of the lanes of traffic. In such a case, if it were true that using an aspheric optical block would necessarily provide a higher degree of resolution near the lens horizon, then certainly Wallerstein would not use an aspheric optical block since this is not where he requires the highest resolution.

In other words, both lens systems comprising and those not comprising aspheric optical blocks can be used to provide panoramic images and both types of system can be designed such as to provide its maximum resolution in a predetermined direction. The point being that there is no evidence in Driscoll that using an aspheric optical block would necessarily give a desired result in all situations; therefore Applicant feels that it is unjustified to conclude that a person of ordinary skill in the art familiar with Wallerstein's arrangement would replace it with another arrangement based on an aspheric block with the expectation of being able to obtain images having higher resolution in a certain portion of the scene.

As discussed, an aspherical optical block will not necessarily result in increased resolution, which is the apparent conclusion that Examiner reaches from [0012] in Driscoll. A mono-block design was chosen by the inventors for entirely other reasons. These reasons include: a mono-block is easier to mount, a mono-block design has a sturdier construction with no possibility of motion between the majority of the optical elements; the optical path can be designed to minimize the number of surfaces from which the rays of light are reflected, thereby reducing scattering and improving image quality; and the surfaces and entrance angles of the light from the scene being imaged can be designed such that the incoming refracted rays are reflected from the upper surface of the main lens (see, for example, claim 1) by total internal reflection and not by a reflective coating which would have to be deposited on part of the upper surface.

b. Claims 15-19 and 21 have been rejected over Wallerstein (US 6,885,509) in view of Driscoll Jr. et al. (US 2004/0008423) and further in view of Doi (US 2003/0099045).

The essence of the examiner's argument is that the combination of Wallerstein with Driscoll teaches an imaging device similar to that of the present invention. Furthermore Wallerstein teaches a holding element, which, although it isn't exactly the same as that of the invention, indicates that Wallerstein is interested in providing his apparatus with such a holding element. Therefore, Wallerstein/Driscoll would somehow discover Doi, who "teaches that in a panoramic image lens having light refracted and reflected similar to that of Wallerstein that it is desirable ..." and would therefore be motivated to incorporate his

teachings into their device to arrive at the present invention.

Applicant disagrees with the examiner and contends that, since there is no teaching by either of these inventors of the necessity or intention of providing a holding device similar to that of the present invention to the imaging device, there is no evidence of motivation on the part of Wallerstein/Driscoll to look for Doi. Applicant argues as follows:

i. The holding element of the present invention serves two functions: Firstly, it "enables direct connection of the main lens to an image capture device, or other mechanical component or connector" (pg. 17, lines 9-10). Secondly it "can be utilized as an illumination connector" (pg. 23, line 5), which conducts light from an illumination source through the main lens in order to illuminate the scene being viewed.

ii. Wallerstein's imaging arrangement comprises a support structure, which he describes as follows (col 2, lines 43-48)": "The support structure 12 may be any device having an upper end 16 which is high enough for purposes of providing a viewpoint of a panoramic scene. The support structure 12 is typically part of a housing for the panoramic imaging arrangement 14 and may, for example, include a vertically extending post, a tripod stand, or part of building structure."

iii. Driscoll, whose invention is a visual conference station, also describes a central post 115 in Fig. 1B. Driscoll describes the purpose of the central post as follows (par [0013]): "According to an embodiment of the present invention, the visual conference station includes a housing having a base and a central post extending upward from the base, and the panoramic lens is mounted at an upper end of the post such that the panoramic lens is maintained a predetermined distance above the underlying conference table."

iv. Both Wallerstein's "support structure" and Driscoll's "central post" have the same function, to support the imaging lens at an appropriate height to view the desired scene. There is no indication that either inventor felt the need to search for a better solution to this problem than that which he had proposed to perform this task. There is also no indication that either inventor was searching for a holding element to perform the two functions of the "holding element" of the invention. Therefore there was no motivation, based on the teachings of Wallerstein or Driscoll, for looking for or making use of the teaching of Doi.

c. The examiner further argues that the fact that the holding element of his proposed Wallerstein/Driscoll/Doi device is not "fabricated together with and part of the optical block" is merely "a matter of obvious engineering choice". Applicant also disagrees with this statement since there are sound technical reasons for preferring an integral design, i.e. this is not a mere matter of choice between two equivalent alternatives, but is a matter of designing the device to obtain optimal results. Applicant lists the following reasons that were behind the decision to fabricate the main lens and the holding element as an integral unit:

i. The fabrication of the holding element as a single mold with the lens saves the need to separately design and manufacture the holding element and the attachment of that element to the lens;

ii. The optical systems of the Applicant are often required to operate under extreme conditions. Fabrication of the holding element as a single mold with the lens eliminates problems of mechanical stress which may be caused by the attachment of the holding element to the lens. Such stress can arise in the attachment area and cause the lens to fracture;

iii. Fabrication of the holding element as a single mold with the lens solves the

to the lens. Such stress can arise in the attachment area and cause the lens to fracture;

iii. Fabrication of the holding element as a single mold with the lens solves the problem of the effects of extreme temperature and temperature changes on two different materials attached together.

iv. In embodiments in which the holding element is utilized as an illumination connector, fabrication of the holding element as a single mold with the lens eliminates interfaces, which could effect the quality of the light that is transferred from the source to the lens.

For at least these reasons Applicant contends that it is not a matter of choice but a matter of necessity that the holding element and the lens be designed and fabricated as an integral unit.

Prior Art Citations:

The examiner has cited Wallerstein, et al. (US 2004/0008407), Powell (US 5,473,474), Greguss (US 4,566,763) and Wallerstein, et al. (US 2002/0154417) as showing wide angle imaging lens assemblies that are relevant prior art. The examiner has not specifically relied on these publications nonetheless Applicant would like to point out that all of these publications describe an imaging lens assembly in which the optical path in the main lens involves double reflection of the ray, as opposed to the single reflection of the ray in the lens of the present invention. This demonstrates that the invention uses a different optical design concept than the cited prior art and therefore is distinguishable from the prior art systems.

The Examiner's acknowledgment of the allowable subject matter in claims 8-9, 14, 20, and 22-24 have been noted with appreciation. However, taking into consideration all of the above, Applicant submits that the present invention represents a novel and significant contribution to the advancement of the art and respectfully requests that the Examiner reconsider his objections and allow all of the pending claims.

In view of the above action and comments, it is respectfully submitted that the application is in condition for allowance, and favorable reconsideration of the application as amended is earnestly solicited.

Respectfully submitted,

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